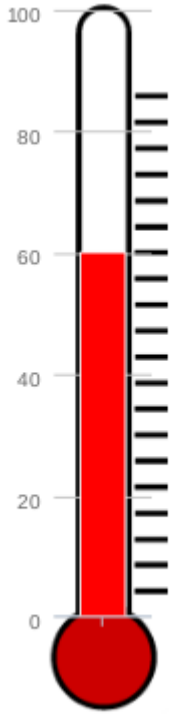
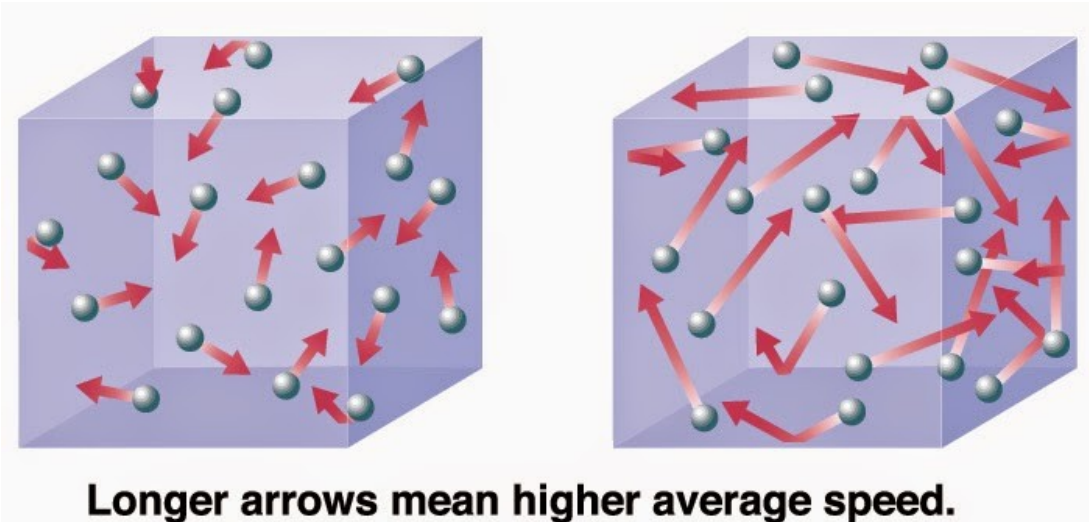
Temperature:

A measure of sensible heat energy present in a substance; indicates the average kinetic energy of individual molecules within a substance.

Temperature





The Effect of Elevation on Temperature.

Most of the solar radiation striking the Earth’s atmosphere is of a wavelength to short to be absorbed by the main gasses comprising the Earth’s atmosphere, and so passes through to the Earth’s surface, which absorbs it and reradiates it as lower energy longer waves which can be absorbed by atmospheric gasses. This heats the part of the atmosphere which is closest to the surface the most. Therefore, the lower part of the troposphere is warmer than the upper part. Due to differences in composition and density, the upper layers of the atmosphere have different temperature patterns.

Normal Lapse Rate

The normal lapse rate, which is used for still air, is the average rate of temperature decrease with increasing altitude in the lower atmosphere; an average value of 6.4 degrees Celsius per thousand meters (3.5 degrees Fahrenheit per thousand feet).

Environmental Lapse Rate.

The environmental lapse rate is the actual rate of temperature decrease with increasing altitude in the lower atmosphere at any particular time and place.

Adiabatic temperature change of air masses.

- As air rises, the amount of air sitting on top of it decreases which decreases the pressure. As the pressure decreases, the air expands. The expansion process uses heat energy, converting it to other forms of energy. This decreases the temperature of the air, making it colder.
- Conversely, as air falls, the amount of air on top of it increases, compressing it. The compression process releases potential energy as heat, warming the air.

Adiabatic Rates of Temperature Change for Rising and Falling Air.

- The dry adiabatic rate (D.A.R.), which is used for unsaturated rising or falling air is 5.5 degrees Fahrenheit per 1000 feet of altitude change.
- For an altitude gain of 1000 thousand feet, the temperature drops 5.5 degrees Fahrenheit, for an altitude loss of one thousand feet, the temperature rises 5.5 degrees.
- For saturated air, the wet adiabatic rate (W.A.R.) is used, which is 3.3 degrees Fahrenheit per thousand feet.

Specific Heat.

Specific heat is a measure of the amount of heat energy it takes to raise the temperature of a specified quantity of a substance a specified amount. In particular, it is the amount of heat, measured in joules, that it takes to raise one kilogram of a given substance one degree Kelvin.

Land-Water Heating Differences and Marine vs. Continental Effects.

Land/Continental

- Low specific heat.
- Rapid, large, temperature swings
- Large day to night temperature differences.
- Large summer to winter temperature differences.
- Found in the interior of continents.

Water/Marine

- High specific heat.
- Slower, smaller, temperature swings.
- Smaller day to night temperature differences.
- Smaller summer to winter temperature difference.
- Found at sea and downwind of large water bodies.

Converting between Celsius and Fahrenheit.

Fahrenheit to Celsius Temperature Readings.

- Celsius = (Fahrenheit – 32) divided by 1.8

- **Fahrenheit to Celsius Unit Conversion.**

Celsius = Fahrenheit divided by 1.8

Celsius to Fahrenheit Temperature Readings.

- Fahrenheit = Celsius X 1.8 + 32

- **Celsius to Fahrenheit Unit Conversion.**

Fahrenheit = Celsius X 1.8